Identification Trainers for the Future: Developing the next generation of expert naturalists at the Angela Marmont Centre for UK Biodiversity

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Abstract

With ongoing losses to UK biodiversity occurring, the need for suitably experienced, passionate biologists who can identify and classify plants and animals, and engage young people with the natural world, has never been greater. There has, however, been a decline in biological field skills, particularly in emerging scientists and graduates, in recent years. This is due to a combination of factors, including our changing relationship with nature, reduced childhood engagement, and a lack of education and training opportunities. Cuts to museum specialists have also occurred, making it more difficult for early career professionals to gain the training required to work in field ecology, taxonomy, and as specialist curators.

The 'Identification Trainers for the Future' traineeship, launched in 2015 by The Natural History Museum (NHM) in partnership with the Field Studies Council (FSC) and the National Biodiversity Network (NBN), and hosted within the Angela Marmont Centre for UK Biodiversity (AMC), is a strong example of how early career professionals can develop ecological field and curatorial skills. It provides a platform for passionate individuals to train future generations in wildlife identification, support naturalist groups, and engage public audiences to connect with the natural world. This paper outlines the aims and key elements of the ID Trainers for the Future traineeship, reflecting on personal experiences. Finally, the paper outlines initial lessons learnt and next steps as the active phase of the programme draws to a close with the final cohort of trainees in spring of 2018.

Keywords: traineeship, conservation, biodiversity, taxonomy, field skills, curatorial skills, citizen science

Why is there a need for the 'Identification Trainers for the Future' programme?

Wildlife and green spaces are fundamental to our human experience, health, and emotional wellbeing. However, social and technological changes, and the fact that nearly 85% of people now live in urban areas in the UK (Denham and White, 1998), have led to a lack of opportunities for people, particularly the young, to engage with wild places. The Natural Environment White Paper published in 2011 states that "*Children are becoming disconnected from the natural environment. They are spending less and less time outdoors. In fact, the likelihood of children visiting*

any green space at all has halved in a generation." (Her Majesty's Government, 2011: p12). Children aged 11 to 15 years, on average, now spend over half of their waking lives in front of TV and computer screens (Sigman, 2007a). This has led to the coining of the term 'concrete children', who spend much of their time indoors, in urban environments, with little or no access to nature or the countryside (Sigman, 2007b).

Professor Simon Leather, course leader for the MSc in Entomology of Harper Adams University has articulated the clear links between the impact of reduced engagement with nature and the lack of identification skills of young people and the public at large (Leather and Quicke 2010). Leather and Quicke (2009; 2010) highlight the inadequacy of primary, secondary, and A Level education to equip young people with identification skills prior to university, and reflects on a decline in these skills among undergraduates. School teachers are not well trained to deal with taxonomic issues, and secondary biology teachers, on average, are unable to identify more than three species of common British wildflowers (Bebbington, 2005 in Leather, 2009). Bebbington (2005) noted that "*conversations with* [A level biology*] students suggest a general feeling that being able to name organisms is not important to them and that they have little interest in acquiring identification skills*."

Environmental campaigner George Monbiot (2012) states that if children are less engaged in the natural world, it will be far more difficult for them to develop the awareness and skills required to monitor and protect it. Papworth et al. (2009) have also recognised that if you are unaware of change around you, you cannot be expected to engage with conservation of the environment.

In September 2016, the State of Nature Report revealed that UK biodiversity is in a precarious situation, following historic industrialisation, deforestation, intensive agriculture, habitat loss, pollution, introduction of non-native species, and climate change as a result of human activity. One in ten species is now threatened with extinction, and nearly two thirds (59%) have declined since 1970. The UK is ranked 189th in the world in terms of its 'biodiversity intactness' (Hayhow et al., 2016). The effective monitoring of UK biodiversity can only take place if there are skilled taxonomists and field naturalists able to collect and analyse data. The House of Lords Science and Select Committee has expressed concerns about the decline in the UK's taxonomic capability (House of Lords, 1992; 2002; 2008), which they have argued undermines its ability to monitor its own biodiversity, ensure environmental sustainability, and meet its international commitments.

A study by the Linnean Society (Cutler and Temple, 2010a,b) reported that the number of professional taxonomists is declining. A Natural Environment Research Council (NERC) strategic review of UK taxonomy highlighted concerns over the failure to replace retiring taxonomists with future generations (Natural Environment Research Council, 2010). Michael Parkin (2015) argued that the decline in biological field skills in emerging scientists, particularly at graduate level, "*has reached crisis point*". He estimated that there are fewer than ten UK graduates each year who are proficient enough in field identification skills to be employable as field ecologists. The role of biodiversity monitoring has become increasingly reliant upon those operating on a voluntary basis (Lyal, 2005), whilst some 'amateurs' are the acknowledged experts for their particular organism group (House of Lords, 2008). However, "*volunteers are not a substitute for trained professional taxonomists, but complement their activity*" (Cutler and Temple, 2010a).

The decline in skilled field biologists has been mirrored by the loss of curators and subject specialists in museums, in the wake of severe cuts to museum funding as a result of austerity measures following the financial crisis of 2007 (Evans, 2012; Viscardi, 2013; Hall, 2015). The continued cuts to curatorial expertise threaten the ongoing care and conservation of natural science collections, their accessibility for research, and usefulness for biological recording, as well as training in identification and taxonomy. There has also been a shift in museum priorities to fund outward-facing public engagement and education activities as opposed to traditional curatorial roles (Kemp, 2015).

Reduced childhood engagement with nature and the systemic failings in the formal education system cited by Leather and Quicke (2009; 2010) have impacted negatively on the opportunities for young people to connect with nature and develop basic identification skills. Therefore, there is a need to train a new generation of suitably qualified natural history specialists, who can in turn inspire and train future generations to understand UK biodiversity.

Meeting the skills gap: field and taxonomic skills training within the UK

The 'Identification Trainers for the Future' programme, led by the Natural History Museum in partnership with the Field Studies Council (FSC) and the National Biodiversity Network (NBN), was developed to address the reduction in ecological field skills and taxonomic training. This programme sits alongside a variety of traineeships, identification training and postgraduate courses that have successfully enabled people, especially young people, to develop biological field skills, taxonomic knowledge, and curatorial skills.

One of the most successful examples of naturalist skills training is The Conservation Volunteer's (TCV) Natural Talent Traineeship programme. The aim of the programme is to increase expertise across the whole of the UK, to protect our less well-known species and create awareness of the habitats that support them (The Conservation Volunteers, 2017a). Initially funded by the Heritage Lottery Fund (HLF) up to 2016 (previously known as the Natural Talent Apprenticeship programme) and now supported by the Esmée Fairbairn Foundation, it has enjoyed considerable success, having delivered 44 apprenticeships between 2006 and 2016 (ibid). The one-year traineeship allows individuals to develop expertise in a specific taxonomic group, habitat, or a mixture of both through placements with environmental charities, record centres, and museums (ibid).

Lancashire and London Wildlife Trust's one-year traineeships are focused on gaining core skills in conservation, volunteer and community engagement (Lancashire Wildlife Trust, 2017; London Wildlife Trust, 2017). Lancashire's 'Biodiverse Society' project is an HLF-funded project to address a skills shortage within the environmental conservation sector. Trainees spend a year gaining practical conservation skills including volunteer leadership, biological recording and species identification, and survey skills, with a strong focus on developing community engagement skills. This is achieved through in-house and external training, a personal project, and on-the-job experience (Lancashire Wildlife Trust, 2017). London Wildlife Trust's 'Wild Talent' traineeship also aims to diversify the workforce, as it only accepts applications from people in receipt of benefits, without a higher education qualification, of black and minority ethnic (BME) origin, or from an economically deprived area of London (London Wildlife Trust, 2017).

There are other well-coordinated programmes of identification training across the UK, and it would be impossible to list them all here. These include training provided by environmental record centres, societies, and museums, which all aim to address the shortage in field skills. Examples include the FSC, a leader in field teaching for schools, colleges and universities. They offer comprehensive field identification courses across terrestrial and marine animals and plants, ecology and conservation courses, and professional taxonomic training (Field Studies Council, 2017a). The Marine Biological Association (MBA) also has an excellent track record in delivering a variety of bespoke training courses and workshops for all levels of expertise, including species identification courses, survey skills, practical skills for marine scientists, and scientific Illustration.

There are also several University postgraduate courses aiming to provide high quality identification and fieldwork skills. To meet the shortage of skilled entomologists and specialists in conservation and agriculture, with specific reference to the future challenges of food security, the MSc in Entomology at Harper Adams University is the only postgraduate course to teach general and applied entomology, and includes a module on taxonomy (Harper Adams University, 2017). Other postgraduate courses offering identification and field training across a range of taxonomic groups include the Msc in Biological Recording at Manchester Metropolitan University (MMU) in association with the Field Studies Council and the Botanical Society of Britain and Ireland, and the Msc in Conservation Management at Edge Hill University.

HLF's 'Skills for the Future' museum training programme (2009 – 2016) aimed to fill skills gaps within the sector (Randell, 2016). As part of this scheme, 16 one-year curatorial traineeships were run from April 2011 to May 2015, initially by Herefordshire Museum Service and subsequently by Birmingham Museums Trust (BMT) from 2013. The programme was run in partnership with several organisations, including the Natural Sciences Collections Association (NatSCA) and NHM. It allowed trainees to gain experience of working in the museum profession under the supervision of experienced curators (Birmingham Museums Trust, 2015). 16 trainees went through the programme, and traineeships were tailor-made to suit individual development needs, providing trainees with the skills to become curators of natural history, ceramics, decorative arts, social history, and agriculture history collections.

The 'Identification Trainers for the Future' HLF Skills Programme

Project Aims:

- Host 15 12-month, work-based traineeships at the NHM supported by FSC and NBN partners
- Trainees will support the UK's taxonomic skills base by focusing on developing UK biodiversity identification, biological recording and museum skills
- Trainees support the work of the Angela Marmont Centre for UK Biodiversity (AMC) as a hub for partnership-based UK natural history information, engagement, training, citizen science and research working with the Identification and Advisory Service, citizen science and curatorial teams (Angela Marmont Centre for UK Biodiversity, 2017)

The 'Identification Trainers for the Future' (or 'ID Trainers for the Future') programme has been funded by the Heritage Lottery Fund (HLF) from 2015 – 2017, and seeks to address the critical and growing shortage of wildlife identification and recording skills in the UK (Natural History Museum, 2016a). It has, to date, provided 15 enthusiastic and committed early career naturalists with work-based training to gain the knowledge, confidence, and skills needed to understand and communicate the value of biological recording, to survey and identify a wide range of UK taxa, to specialize in a particular group, and to handle and curate reference specimens. Importantly, the trainees also develop science communication, teaching and public engagement skills in order to train others.

The programme provides for the training of five candidates a year in UK biodiversity, biological recording, ecological field skills, and curatorial skills (Natural History Museum, 2016a). These subjects are taught by leading scientists, field ecologists, and curators. Steph West, Project Manager of the Identification Trainers for the Future Project, states that: "*Our most highly skilled species identifiers and taxonomists are often amateurs and many of them are at, or beyond, retirement age. Younger ecologists are leaving universities with great qualifications but without the detailed knowledge of a true specialist…often graduates leave university with very little idea of how to start developing their skills in this area and very little exposure to field recording. We want to help turn this situation around via our traineeship scheme.*" (Natural History Museum, 2016b).

The Angela Marmont Centre for UK Biodiversity (AMC)

Throughout the 12-month traineeship, trainees are based in the AMC, which sits within the NHM's Darwin Centre. The AMC's core goal is to further the appreciation, study and understanding of the UK's natural history. The AMC forms a focus for a wide range of projects that, together, aim to address two of the central problems facing UK biodiversity and geodiversity science:

- How to inspire and support existing and future naturalists
- How to actively engage the wider public in natural science

The AMC's mission is to inspire and support existing and future naturalists, by working closely with the UK's amateur-expert naturalist community (Angela Marmont Centre for UK Biodiversity, 2017). This is to ensure the continued stability and expertise in taxonomy and systematics needed to describe, record and monitor the UK's biological and geological diversity during a time of major environmental challenges (Ibid). The core staff of identification officers, ecologists, curatorial and citizen science professionals are supported by expert scientists from across the Darwin Centre.

The AMC hosts the Identification and Advisory Service, which is provided by a dedicated team of Identification Officers whose job it is to work with members of the public, and commercially, to identify natural history finds. The Identification and Advisory Service provides support for people of all ages and abilities to identify their specimens of wildlife, fossils and other geological finds either face-to-face, over the phone, by post, or the online NaturePlus forum (Angela Marmont Centre for UK Biodiversity, 2017). With the help of the Identification Officers, visitors can learn more about a species group or aspect of UK biodiversity, access reference collections and training opportunities, as well as information about how to access naturalist groups near them.

The AMC is also responsible for the UK Species Inventory, a database of the names of all British wildlife that is used by most UK biological recording and reporting systems. The AMC's UK reference collections, including the British and Irish Herbarium, British Entomology Collection, and the library of the London Natural History Society (LNHS) are excellent resources with which aspiring naturalists can hone their identification skills and passion for the natural world (Natural History Museum, 2016c). The AMC

provides workshop spaces, which can be booked out free of charge by naturalist societies. Regular users include the Earthworm Society of Great Britain, the Conchological Society of Great Britain and Ireland, and the Botanical Society of Britain and Ireland.

The Traineeship Experience

Anthony Roach (AR) was selected as one of the five candidates for the first cohort of the 'Identification Trainers for the Future' traineeship programme (March, 2015 – February, 2016) (see Figure 1). The rest of this paper will be devoted to the traineeship experience, including Roach's personal insights (shown in italics) and the authors' contribution to the public engagement activities of the AMC, lessons learned, and outcomes of the programme.

Figure 1. Cohort 1 of the ID Trainers outside the AMC Image: Stephanie West (Right to left - Sally Hyslop, Mike Waller, Katy Potts, Anthony Roach, Chloe Rose). Image: A. Roach.

The 'ID Trainers for the Future' traineeship was taught in four key phases. As the traineeship consisted of work-based training, trainees were expected to develop a training portfolio, comprising reviews of each of the phases, ID workshops and FSC placements, a weekly Personal Journal to track progress, associated blog entries, detailed notes and identification resources, and examples of project work, to form a detailed record of experiences. This was produced alongside a formal *Record of Training*. From the outset of the training, both individually and as a team, trainees were expected to contribute to the writing of blogs and other publications about our experiences, both internally at the NHM and with our NBN partner, as well as presenting at the annual NBN Conference.

Phase 1: Introduction (1 Month)

Phase 1 focused on museology, object handling and conservation, natural history collections best practice, and an overview of UK biodiversity from the Holocene to the present day. It also included professional development training, a detailed study of taxonomy and taxonomic delimitation, and visits to the Linnean Society of London to understand the history and development of Linnaeus' system of classification and the contribution made by founding naturalists such as Sir John Ray and Sir Hans Sloane (see Figure 2). With the NBN as a major partner, Rachel Stroud, NBN Data Officer throughout the traineeship, provided excellent support, both from the perspective of a data manager and as a mentor. Stroud delivered a number of courses, the first of which was on the handling and use of biological data. Alongside this, courses on the handling and pinning of entomological specimens, field skills, and fieldwork first aid provided a strong foundation on which to develop curatorial and naturalist skills in preparing reference collections. Trainees also attended a series of professional skills training courses, including Communication and Influencing Skills, Assertiveness, Team Working, Time Management and Networking.

Figure 2. The ID Trainers pictured during a tour of the Linnean Society of London to learn about the founding naturalists and father of taxonomy Carl Linnaeus. Image: A. Roach.

Phase 2: Developing core skills (5 months)

Phase 2 focused on developing core knowledge of key taxonomic groups through a mixture of practical lab identification and field survey courses, and a work placement within the AMC, moving between the Identification & Advisory Service, the Citizen Science team, and later assisting with the Public Outreach programme. Identification courses included lichens, mosses, freshwater invertebrates, beetles,

earthworms, and moths (a full list can be found on the ID Trainers website (Natural History Museum, 2016a)). Usually, three to five days were spent with curators and field ecologists, in order to familiarise oneself with the group, understand the core characters for identification, collect specimens in the field, and learn techniques for creating reference collections. This included handling and pinning techniques, and time spent identifying specimens using keys and reference collections (see Figure 3). Phase 2 also included teaching placements with Primary and Secondary School students at The Old Malthouse residential school in Purbeck, Dorset.

Figure 3. Coleoptera identification training. Image: A. Roach.

With the FSC as a major partner, each ID Trainer was able to choose two field placements, the first of which was shadowing and assisting at a Field Studies Council Centre, which involved taking part in field teaching with school and public audiences. The second field placement was an identification course based around a specific taxon or area of interest, in order to begin developing a specialism.

Due to my interest in invertebrates, and a desire to improve my knowledge of flowering plants, I chose Flatford Mill as my FSC Centre, where I was able to observe the workings of the centre and shadow two courses ('Wildflower Identification: Top 20 Families' and 'Identifying and Sampling Freshwater Invertebrates', which was held at Flatford Mill in Suffolk). Over the course of the 10 days, I spent time assisting the field tutors in sampling, and could confidently use a variety of identification keys and understand techniques for freshwater sampling. All of these courses had common elements: focused identification training, field surveying and teaching, and opportunities to take part in the life of an FSC Centre. For example, fellow ID Trainer Sally Hyslop came face to beak with puffins on the Welsh coast at FSC Dale Fort; Mike Waller was able to indulge his passion for plants and ancient relic landscapes at FSC Malham Tarn; Chloe Rose discovered seashore life at FSC Millport; and Katy Potts found stunning alpine plants at FSC Rhyd-y-creuau. My third course, along with the other trainees, was in identifying fungi and held at the base of the Cairngorms National Park.

Phase 3: Developing a Specialism (3 months)

In Phase 3, trainees were given the opportunity to refine their identification skills, develop detailed knowledge of a species group, and develop curatorial skills on a specialist collection. Identification training was provided in Dorset, with ecologists from the AMC. Trainees undertook bat surveys and moth trapping, and learned more about Studland's wildlife, as well as the coastal plants of the Isle of Purbeck.

A list of curatorial projects was put forward by NHM curators, based on understudied areas of the collections. These ranged from re-curating Dr Francis Rose's lichen collection, creating a key to British parasitic wasps of the genus *Alexeter*, to assessing the beetle fauna of Bookham Common in Surrey. More information about the various curation placements can be found by visiting the ID trainers blog (Natural History Museum, 2016d).

I was asked to re-curate the existing collections of late 19th and early 20th century UK dragonflies and damselflies (Odonata). There are currently 45 resident species of dragonfly in the UK. Historically, they were some of the first entomological specimens to be collected, featuring in the early 17th century collections of James Petiver and Sir Hans Sloane. My first job was to remove the specimens from their old cork-lined drawers and place them into new plastazote-lined unit trays. The specimens themselves were incredibly delicate, and needed to be handled with precision. Often, very old pins suffer from Verdigris, which can easily destroy the body of an insect. Each specimen was individually barcoded with a small label made from archival standard card that was attached to its pin. The label contained a unique specimen number. A specimen-level record was then produced for each specimen in the collections management system Ke-Emu, and the taxonomy was updated to take into account changes to Odonata classification.

One of the elements of this three-month curatorial project was to create a synoptic collection of each British Dragonfly species. This was accomplished by going systematically through the existing British collection and, where possible, identifying one male and one female to represent each species, along with sub-species and colour variants of each species (see Figure 4). This helped me to really understand the identification of UK species

of Odonata, by studying the abdominal segments, eye colour, and colour variations of the same and different species. The project also resulted in a set of specimens that can be used for publication and public engagement activities. Imaging the collection was something Dr. Ben Price was keen to do, in order to generate more information about the collection. I was asked to undertake image label testing to determine angles for data labels to be read and eventually electronically transcribed using computer software. The label image testing and digitisation were also undertaken to improve the accessibility of the collection for future research.

Figure 4. Some of the specimens from the newly created Synoptic collection of UK Odonata. Image: A. Roach.

Phase 4: Skills transfer and training delivery (3 months)

Phase 4 allowed the trainees to consolidate what they had learned by developing a useful written or practical teaching resource for identification. This could be an online key or guide to aid the identification of a species group, a resource to be delivered as part of an identification workshop, or a 'how to' guide to running a bioblitz, workshop or other practical identification training session.

Final elements of the traineeship were dedicated to ensuring trainees were equipped with training and teaching delivery skills. Two weeks were spent with both NHM's Science Educator team and assisting the Learning Volunteer Program, to develop the trainees' knowledge of learning theory and object–based learning with museum audiences. All trainees completed a Level 3 Award in Education and Training, awarded by Ofqual, which was taught by the Field Studies Council and delivered at Blencathra Field Centre in the Lake District. This provided a further foundation in the approaches to learning theory, understanding the roles and responsibilities of teachers, lesson planning, and teaching delivery.

In Phase 4, I ran an identification training course for fellow trainees on spider identification at Blencathra Field Centre. This was part of my assessment to gain a Level 3 Award in Education and Training. I was required to build on previous spider identification guidance, and simplify terms and identification characters to ensure it was more inclusive and suited differing abilities.

Towards the end of phase 4, I requested to work with the NHM's Conservation team. I was very fortunate to work on the Blue Whale skeleton which is now displayed in Hintze Hall. During my brief period helping On this project, I spent time removing the old wire armature, cleaning using conservation grade materials, and photographing the chevrons on the underside of the tail vertebrae. It was a fantastic opportunity to see the blue whale skeleton up close, and talk to the public about the conservation work.

Citizen science at the Angela Marmont Centre for UK Biodiversity

The AMC has a strong track record of developing innovative citizen science projects that allow both online and field-based participation in UK wildlife, to inspire future naturalists. As an ID Trainer for the Future, AR was able to manage and assist in public engagement through two citizen science projects, the 'Big Seaweed Search' and 'Orchid Observers' (Natural History Museum, 2016e).

The Big Seaweed Search

The Big Seaweed Search is a citizen science project that engages people of all ages to monitor the effects of environmental change on Britain's shores, by exploring the seashore and recording the living seaweeds that they find there. It asks the public to record eight seaweeds that are influenced by sea temperature rise, four non-native species to monitor their spread, as well as finding evidence of ocean acidification through the presence of coral crusts and coralline seaweeds (Natural History Museum, 2016f). The project was established in 2009 as a joint project between NHM and the Open Air Laboratories (OPAL), and was launched at the Wembury Bioblitz event. During this bioblitz, an incredible 823 different kinds of plants, animals, and fungi were recorded in a 24-hour period (Marine Biological Association, 2009). The project was relaunched in 2016 as a joint NHM-Marine Conservation Society project. Before it's relaunch, The Big Seaweed Search had generated over 1700 individual observation records, with over 300 participants recording Seaweeds across the British Isles.

My involvement in the Big Seaweed Search project involved delivering public outreach, working with marine scientist Juliet Brodie and Citizen Science Project Manager Lucy Robinson to evaluate the success and reach of the project, and write a summary report to 2015. In preparation for a re-launch, I was asked to develop a web design brief to refresh existing web content, manage enquiries, and work with new and existing stakeholders to launch a new and updated survey that considered new science research questions, alongside the original ones.

Orchid Observers

The Orchid Observers citizen science project was developed by the NHM in partnership with Zooniverse, and aims to investigate how the flowering times of 29 UK species of orchids are being affected by climate change. A secondary aim was to understand how volunteers share ideas and knowledge with one another (Robinson, 2016). The project asked the public to take photographs of any of the 29 species and upload them, identify species in photographs that others have uploaded, and/or transcribe herbarium sheet information for NHM specimens. Online participation generated interest in NHM's existing herbarium specimens from volunteer and naturalist communities, and enabled the public to contribute to real scientific data by finding and photographing orchids across the UK during the flowering season, and uploading records. The project saw over 2000 volunteers take part, and produced more than 1800 new observations of wild orchids (Robinson, 2016).

Outcomes and Lessons Learnt

The 'ID Trainers for the Future' programme provides trainees with the taxonomic grounding to further develop their careers as specialists, albeit alongside further on-the-job training and academic study. Having specialists in entomology, field ecology, UK biodiversity, citizen science, and identification all in one place within the AMC made a great difference to the development of the trainees. The support given throughout the programme, including mentoring for projects and future careers preparation, helped all five trainees in the first cohort gain positions within the conservation and ecology sector within six months of completing the traineeship. Cohort two are now also fully employed, variously at the NHM, Natural England, and the Hampshire Wildlife Trust. This demonstrates that the skills and training provided by the programme are valuable to employers, in a highly competitive sector.

The project team are now drawing together evidence for full evaluation of the project, as the traineeships themselves reach their concluding stages. A full report and associated seminar will be announced early in 2018, which will not only celebrate the success of the project and the trainees, but also share the lessons learned from running the project and look forward to the legacy of the work. Some statistics on the delivery of skills training as a result of the ID trainers course, and the development of biodiversity skills in the AMC, are outlined below (West and Tweddle, 2017).

Training delivered with the ID Trainers for the Future:

- 62 Taxonomy Workshops
- 53 site visits
- 48 Employability skills workshops
- 33 NHM experts delivered training
- 172 non-trainee participants

Developing Biodiversity skills in the AMC (2013-17):

- 1.3k attending training workshops
- 46.3k participants in field-based citizen science
- >35k face-to-face interactions at events
- 12.4k public enquiries answered
- >75k downloads of ID guides and apps

Although the project is now drawing to a close, it has had a profound impact on the ways of working within the AMC and the wider NHM. The identification materials the trainees have produced over the past three years will remain available to all long-term through our website, and we will be adding to these as the final projects are completed over the next few months. In terms of the wider aims of the project, however, not only has the project challenged us to look at new ways of recruiting, but has enabled us to look into the question of encouraging diversity in new applicants, a known significant issue both for the museums sector and the UK biodiversity sector. Information and networks gathered through the project have enabled us to look more broadly at diversity issues within the NHM, and this has assisted in the formation of a cross-departmental diversity working group within the Museum.

In terms of training delivery, a new post of UK Biodiversity Training Manager has been created within the Angela Marmont Centre, and currently a strategy for training in UK natural science is being

formulated which will steer the future training offer from the UK Biodiversity Centre. Examples include expanding on opportunities to deliver taxonomy courses around the key taxa covered by the trainees to all interested parties as 4-5 day workshops. The aim is to build on the framework of training which was developed for the ID Trainers project, and to expand and broaden this offer in a way that will not only support early-career natural historians, but also the existing natural science networks, as well as encourage, engage, and enthuse audiences who may not previously have considered natural science as a viable and interesting career.

The life of an ID trainee was a challenging and rewarding experience. It provided me with an excellent grounding in species identification, and I benefited in a host of other ways. This included understanding the value of biological recording to biodiversity study, environmental monitoring, and conservation. I gained a strong understanding of taxonomy, use of appropriate field techniques, the ability to identify organisms to family and species level, and curate and use reference and field voucher specimens to do this. I gained an understanding of systems for managing biodiversity data, and developed a specialism in freshwater invertebrates. Through placements with the Field Studies Council, and benefiting from the National Biodiversity Network, I developed a strong awareness of the individuals, voluntary groups and professional bodies who contribute to the biological recording effort in the UK and the data flow pathway. I further enhanced my professional development and public engagement skills by gaining a teaching qualification, and was able to put my teaching and identification training skills into practice. This has ultimately benefited me in joining Earthwatch Institute, where I develop citizen science training for schools and community groups.

Conclusion

As the current biodiversity crisis worsens, and children continue to spend more time indoors and away from nature, it is vital that museums and scientific institutes support the development of subject specialists who can continue to inspire young people to take an interest in the natural world, and to encourage them into scientific careers. Passionate experts in museums can provide meaningful opportunities for public audiences, particularly the young, to connect with nature. Supporting future naturalists is something that can be achieved through training, public engagement, and citizen science activities undertaken alongside passionate experts, as demonstrated by the 'ID Trainers for the Future' programme at the Angela Marmont Centre for UK Biodiversity.

The 'Identification Trainers for the Future' programme is one example of a scheme that aims to halt the observed decline the number of specialist taxonomists by enabling graduates and early career professionals to develop their field ecology, identification, and curatorial expertise. All five trainees in both the first (2015-16) and second (2016-17) cohorts went on to secure jobs in the ecology and environmental sector within six months of completing the traineeship. Meanwhile, 90% of TCV's Natural Talent trainees were employed into the conservation sector soon after completing their traineeships (Horsley and McFarlane, 2017), and 70% of Birmingham Museums Trust's HLF trainees had already gained employment after completing their training (Birmingham Museums Trust, 2015). This demonstrates that traineeships are an effective way of filling skills gaps in biological recording, curation, and conservation, alongside universities and other training providers.

These traineeship schemes have shown that on-the-job skills training can build successful careers in conservation and museums. The future is therefore more positive for new generations of naturalists, and for wildlife conservation in the UK.

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